ONTARIO MINISTRY OF ENVIRONMENT
3693600024449

OPERATING SUMMARY

LIBRARY COPY
MAR 24 1975
MINISTRY OF THE ENVIRONMENT

TD
367
.A56
R53
1973
MOE

RICHMOND HILL

WATER POLLUTION CONTROL PLANT

1973

TD
367
.A56
R53
1973

Richmond Hill : water pollution control plant.
81836

Ontario

MINISTRY OF THE ENVIRONMENT

MINISTER
Honourable William G. Newman

DEPUTY MINISTER
E. Biggs

ASSISTANT DEPUTY MINISTER
REGIONAL OPERATIONS
J. Barr

REGIONAL OPERATIONS DIVISION

DIRECTOR, CENTRAL REGION
P. Cockburn

MANAGER, UTILITY OPERATIONS
A. Thomas

RICHMOND HILL

WATER POLLUTION CONTROL PLANT

operated for

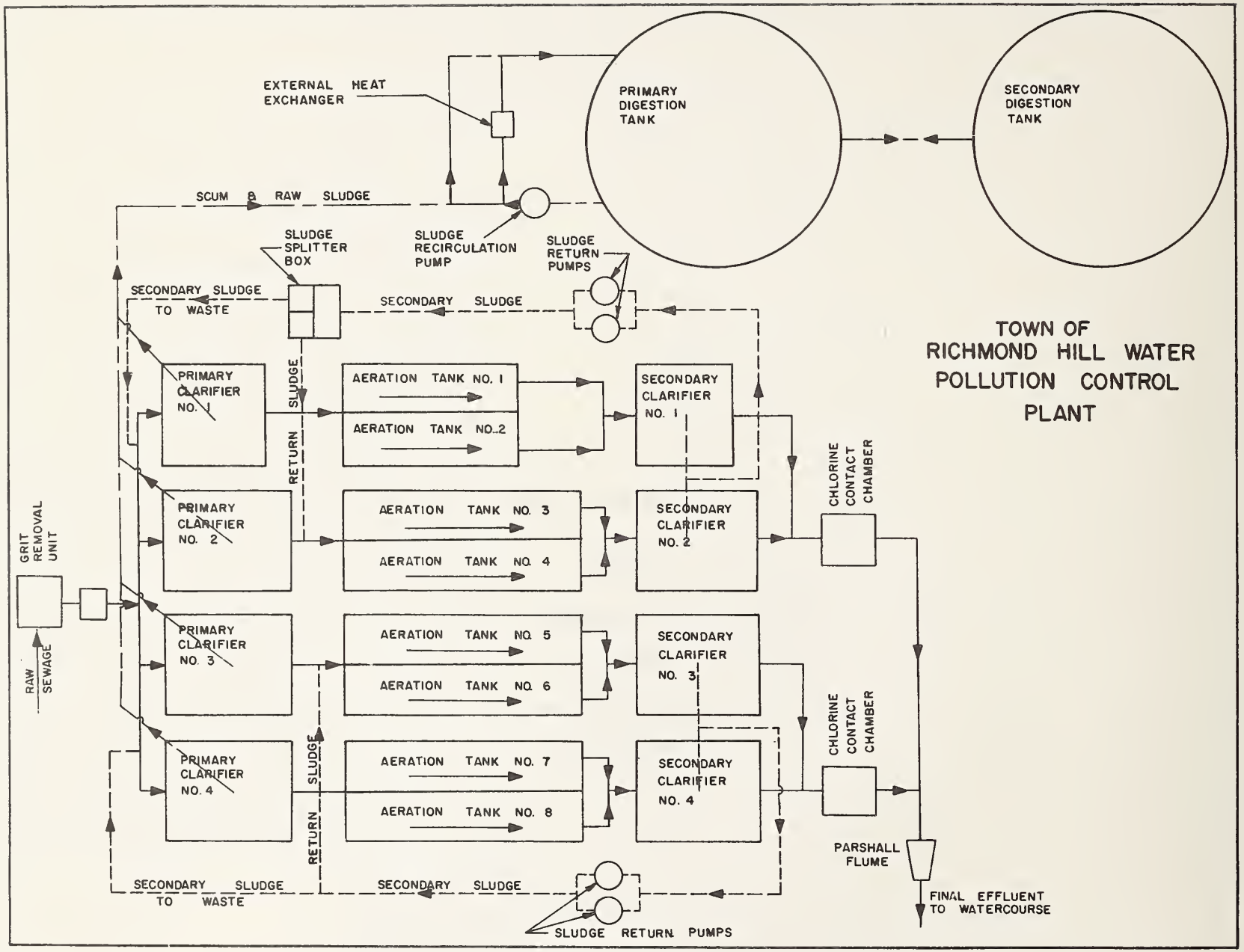
THE TOWN OF RICHMOND HILL

by the

MINISTRY OF THE ENVIRONMENT

1973 ANNUAL OPERATING SUMMARY

prepared by
Plant Performance Unit
TECHNICAL SERVICES BRANCH
T. Cross, Director


EXTERNAL HEAT EXCHANGER
PRIMARY DIGESTION TANK
SECONDARY DIGESTION TANK
SCUM & RAW SLUDGE
SLUDGE SPLITTER BOX
SLUDGE RECIRCULATION PUMP
SLUDGE RETURN PUMPS
SECONDARY SLUDGE TO WASTE
SECONDARY SLUDGE
TOWN OF RICHMOND HILL WATER POLLUTION CONTROL PLANT
PRIMARY CLARIFIER NO. 1
AERATION TANK NO. 1
AERATION TANK NO. 2
SECONDARY CLARIFIER NO. 1
SLUDGE
RETURN
CHLORINE CONTACT CHAMBER
GRIT REMOVAL UNIT
PRIMARY CLARIFIER NO. 2
AERATION TANK NO. 3
AERATION TANK NO. 4
SECONDARY CLARIFIER NO. 2
RAW SEWAGE
PRIMARY CLARIFIER NO. 3
AERATION TANK NO. 5
AERATION TANK NO. 6
SECONDARY CLARIFIER NO. 3
PRIMARY CLARIFIER NO. 4
AERATION TANK NO. 7
AERATION TANK NO. 8
SECONDARY CLARIFIER NO. 4
PARSHALL FLUME
FINAL EFFLUENT TO WATERCOURSE
SECONDARY SLUDGE TO WASTE
SECONDARY SLUDGE
SLUDGE RETURN PUMPS

DESIGN DATA

PROJECT Town of Richmond Hill WPCP

PROJECT NO. 2-0006-57

TREATMENT Activated Sludge

DESIGN FLOW 1.60 mgd

DESIGN POPULATION 16,000

BOD - Raw Sewage 200 mg/l
- Removal 90%

SS - Raw Sewage 220 mg/l
- Removal 95%

PRIMARY TREATMENT

Grit Removal

Type: Aerated
Size: One $15\frac{1}{2}$' x 6' x 9' swd (5,220 gal)
Retention: 4.7 min

Primary Sedimentation

Type: Dorr
Size: One 16' dia x 10' swd
One 26' dia x 10' swd
Two 26' dia x 9.7' swd
(110,000 gal)
Retention: 1.65 hr
Loading: Surface, 908 gal/ft^2/day
Weir, 4880 gal/ft/day

SECONDARY TREATMENT

Aeration Tanks

Type: Diffused air; single-pass
Size: Two 58' x 9' x 9'
Two 81' x $14\frac{1}{2}$' x $10\frac{1}{4}$'
Four 81' x $14\frac{1}{2}$' x 9 1/3'
(482,700 gal)
Retention: 7.2 hr

Diffusers

- Carborundum diffusers

Air Supply

a) Type: Standaire (C.P.)
Size: One 400 scfm
Two 510 scfm

b) Type: Sutorbilt
Size: One 1,000 scfm

Secondary Sedimentation

Type: Dorr
Size: One 19' dia x 10' swd
One 30' dia x 10' swd
Two 30' dia x 9.7' swd
(147,180 gal)
Retention: 2.21 hr
Loading: Surface, 667 gal/ft^2/day
Weir, 4120 gal/ft/day

CHLORINATION

Type: W & T
Size: One 200 lb/day

Chlorine Contact Chamber

Size: Two 25' x 10' x 8' (25,000 gal)
Retention: $22\frac{1}{2}$ min

OUTFALL

- to German Mills Creek

SLUDGE HANDLING

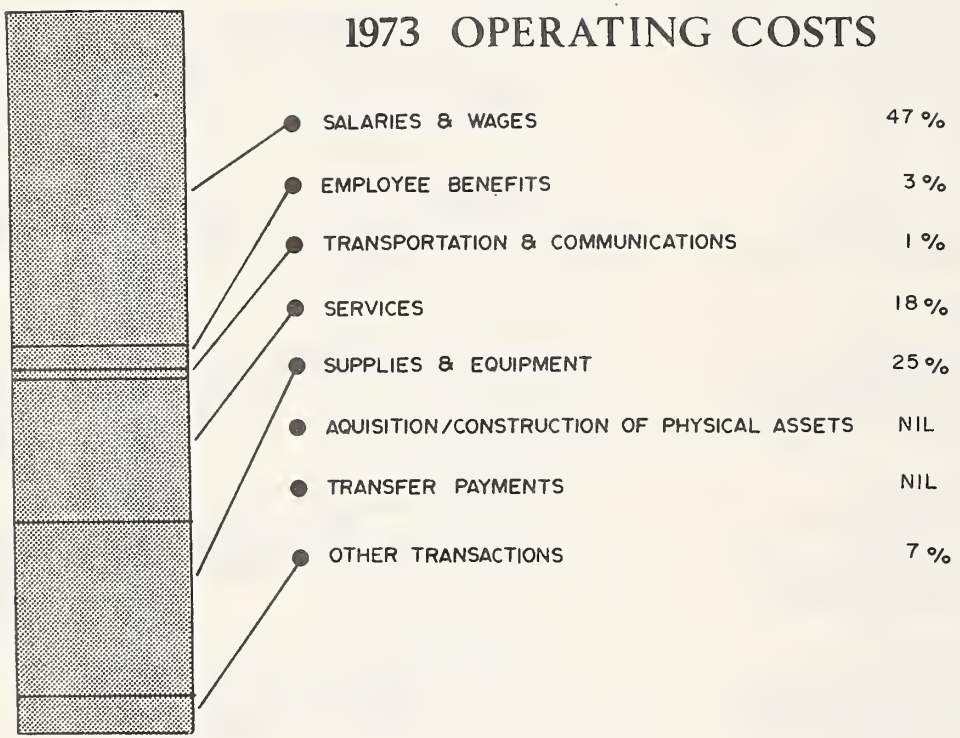
Digestion System - two-stage

Primary --
Type: Walker, 1 draft tube
Size: One 50' dia x 20' swd (39,200 ft^3 or 0.245 mil gal)

Secondary--
Type: Dorr (has one draft tube)
Size: One 30' dia x 19' swd (13,400 ft^3 or 83,500 gal)

ANNUAL COSTS

1973 OPERATING COSTS



YEARLY OPERATING COSTS

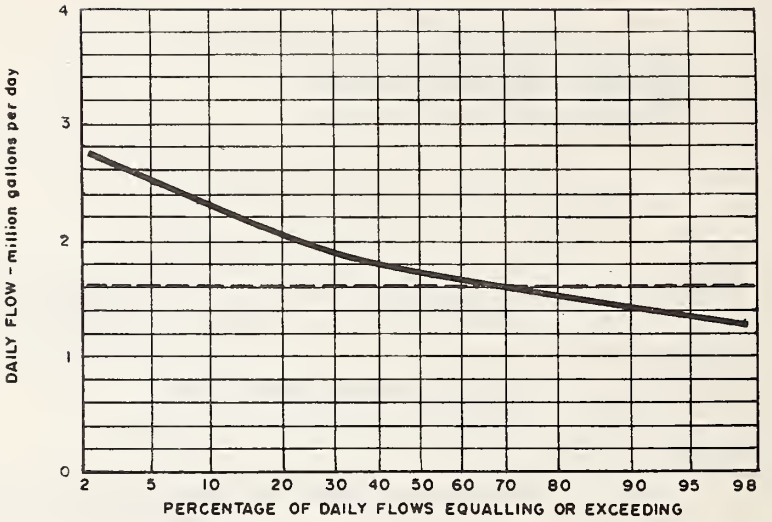
YEAR	SEWAGE TREATED in million gallons	TOTAL OPERATING COSTS	UNIT COSTS $/M.G.	UNIT COSTS ¢/lb BOD
1968	705	$ 53,637	76	6
1969	770	60,795	79	7
1970	822	78,533	95	8
1971	865	76,760	89	4
1972	663	95,203	144	10
1973	688	97,585	142	8

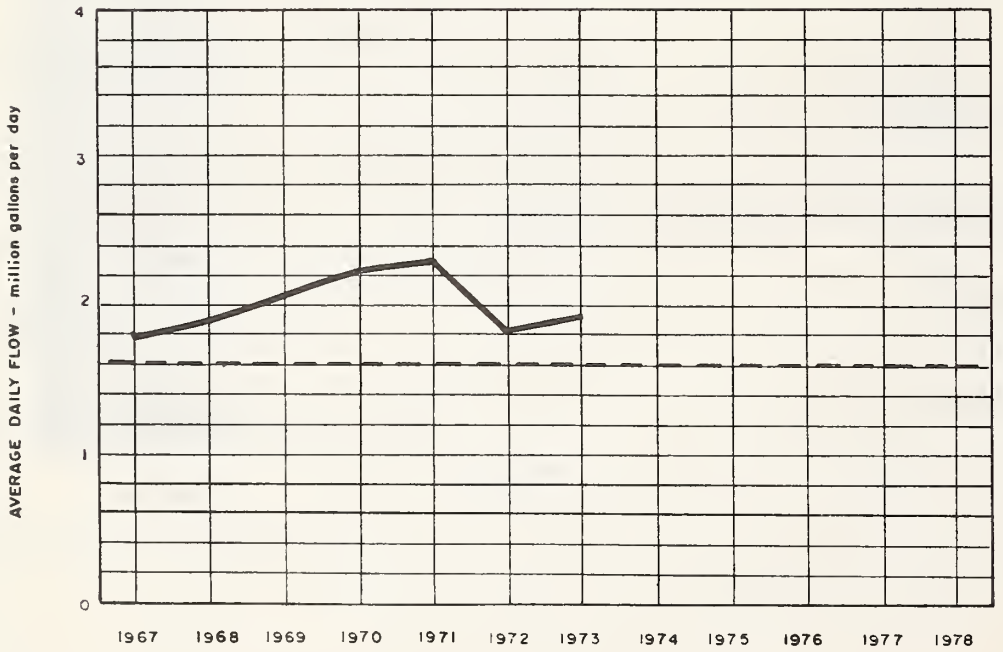
OPERATING EXPENDITURES

SALARIES AND WAGES	$45,505
EMPLOYEE BENEFITS	2,576
TRANSPORTATION & COMMUNICATIONS	736
SERVICES	17,388
SUPPLIES AND EQUIPMENT	24,151
ACQUISITION/CONSTRUCTION OF PHYSICAL ASSETS	0
TRANSFER PAYMENTS	0
OTHER TRANSACTIONS	7,229
TOTAL	$97,585

PROCESS DATA

FLOWS



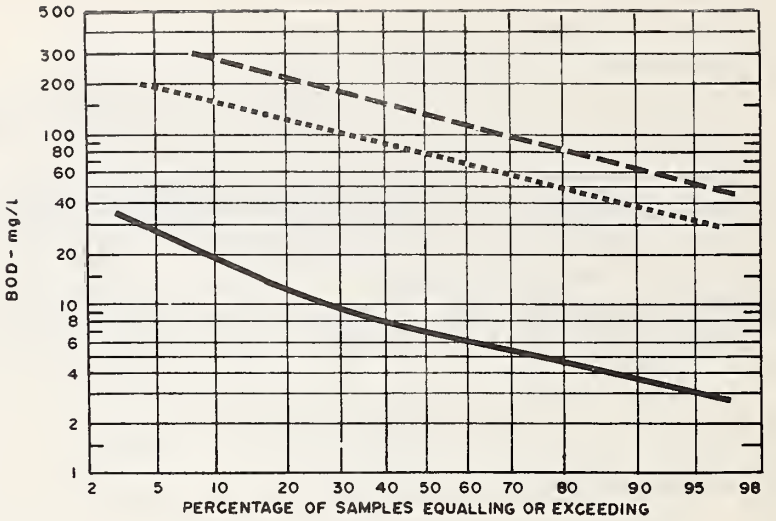


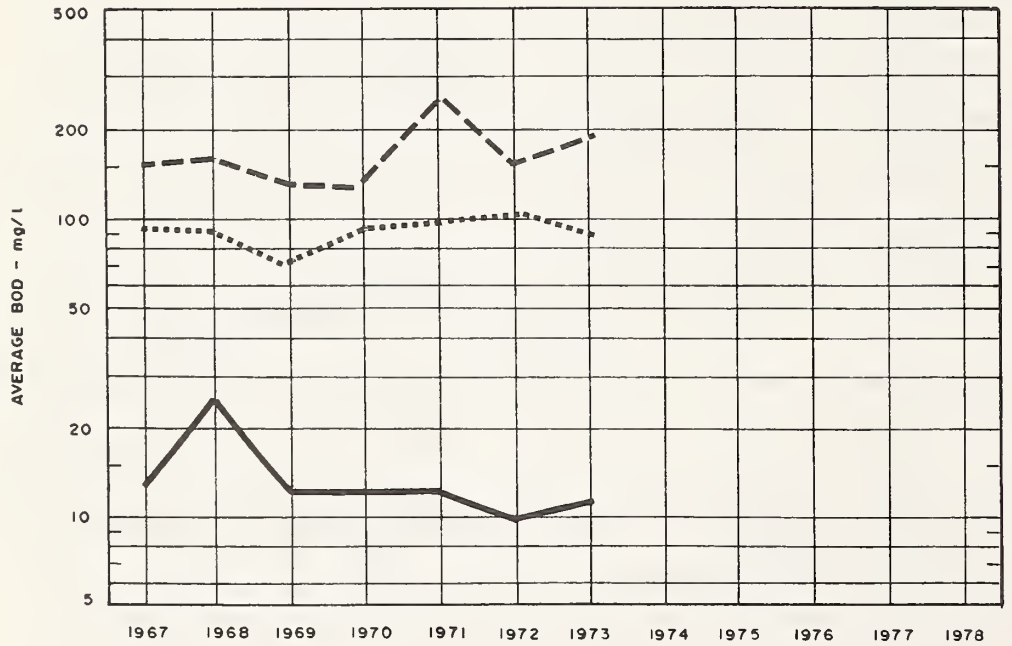
DESIGN CAPACITY _ _ _ _ _ _ _

PLANT PERFORMANCE

MONTH	FLOWS			BIOCHEMICAL OXYGEN DEMAND				SUSPENDED SOLIDS				PHOSPHORUS	
	TOTAL FLOW	AVERAGE DAY	MAXIMUM DAY	INFLUENT	EFFLUENT	REDUCTION		INFLUENT	EFFLUENT	REDUCTION		INFLUENT	EFFLUENT
	million gallons	mil. gal	mgd	mg/l	mg/l	%	10^3 pounds	mg/l	mg/l	%	10^3 pounds	mg/l P	mg/l P
JAN	60	1.9	2.6	100	10	90	54	120	20	84	63	6.2	4.2
FEB	47	1.7	2.6	130	21	84	50	860	48	94	380	7.4	5.4
MAR	72	2.3	3.0	120	9	93	80	230	8	97	160	9.3	3.4
APR	63	2.1	3.0	660	15	98	400	700	23	97	420	14.0	4.2
MAY	92	2.0	2.6	200	21	89	110	700	10	99	420	8.2	3.7
JUNE	53	1.8	2.0	160	21	86	71	260	20	92	130	8.5	3.0
JULY	45	1.5	1.7	150	5	97	66	280	8	97	120	7.5	4.1
AUG	48	1.5	1.8	120	8	93	55	160	8	95	70	5.8	4.0
SEPT	48	1.6	1.8	160	6	96	76	320	10	97	150	7.6	4.1
OCT	50	1.6	2.4	160	7	96	79	700	38	95	330	8.4	4.2
NOV	54	1.8	2.7	140	3	98	74	200	10	95	100	8.7	3.8
DEC	56	1.8	2.9	73	4	95	39	110	15	86	54	6.0	3.9
TOTAL	688	-	-	-	-	-	1154	-	-	-	2397	-	-
AVG.		1.9	MAXIMUM 3.0	180	11	94	96	400	19	95	200	8.1	4.0
No. of Samples	-	-	-	23	23	-	-	22	23	-	-	23	23

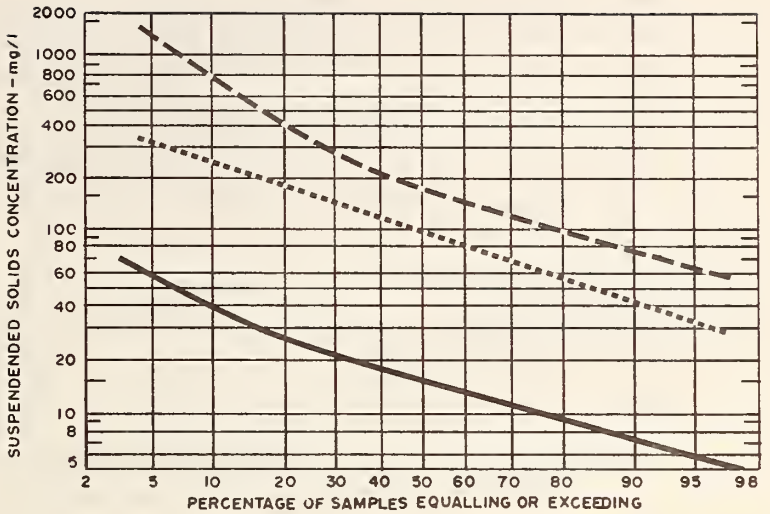
BIOCHEMICAL OXYGEN DEMAND

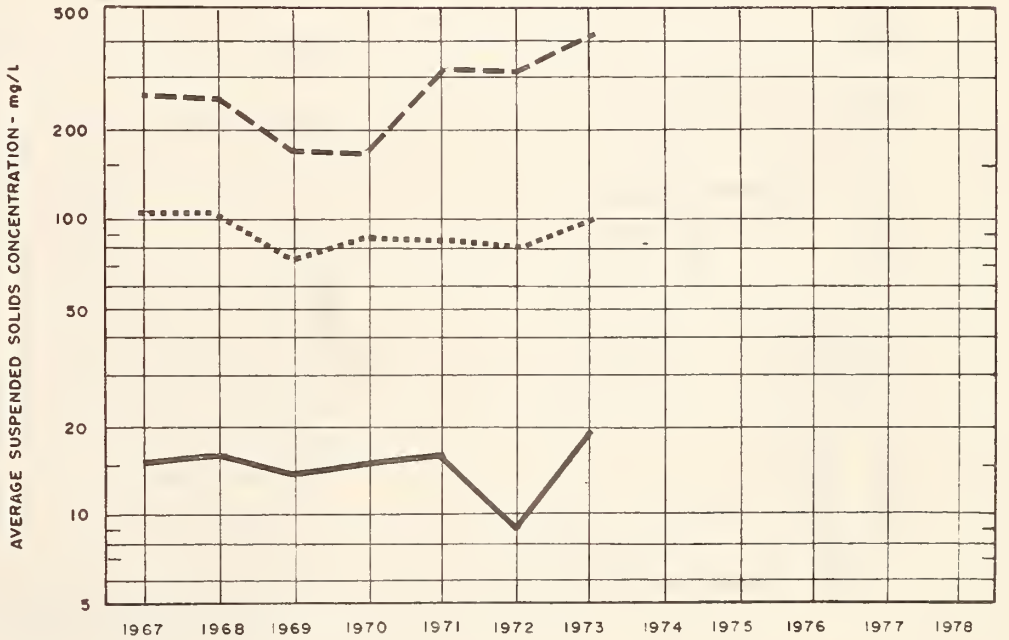




PLANT INFLUENT
PRIMARY EFFLUENT
PLANT EFFLUENT

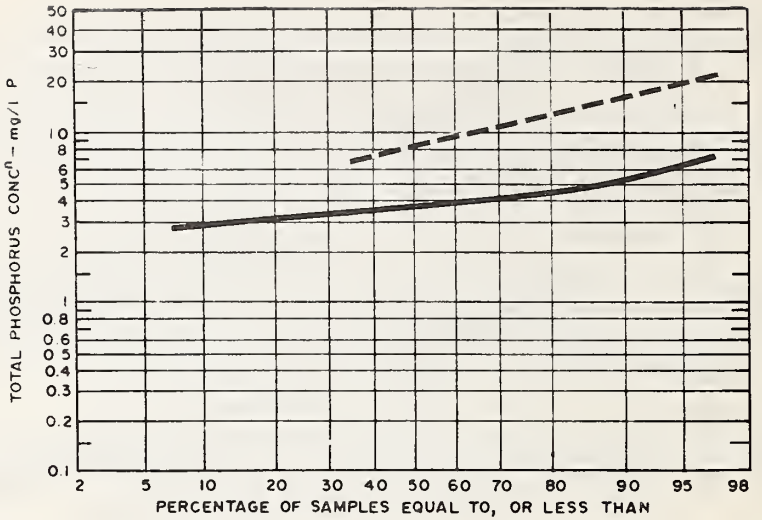
SUSPENDED SOLIDS

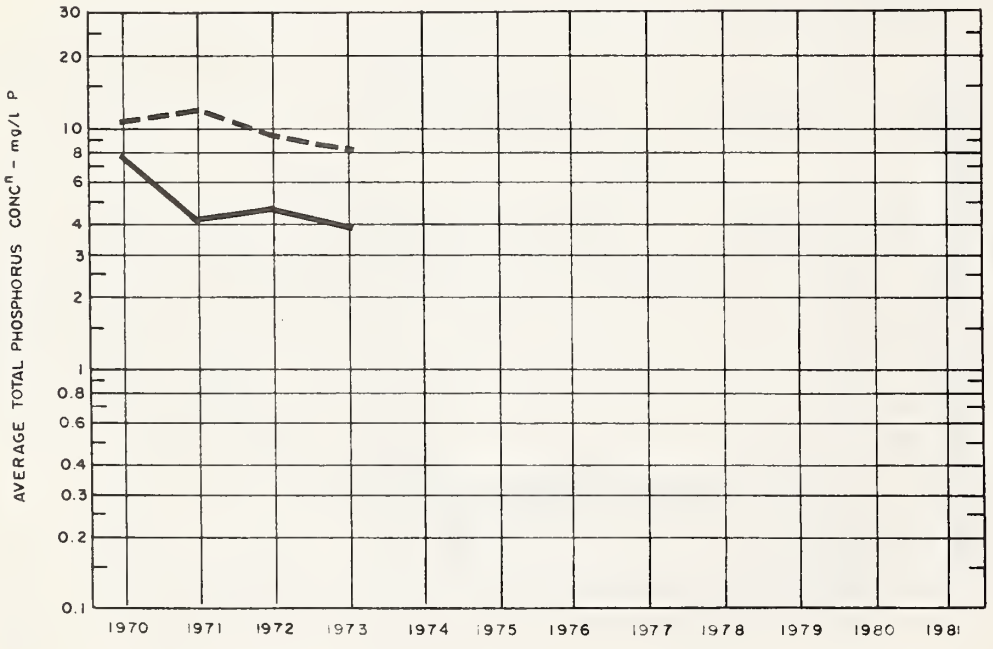




PLANT INFLUENT
PRIMARY EFFLUENT
PLANT EFFLUENT

PHOSPHORUS

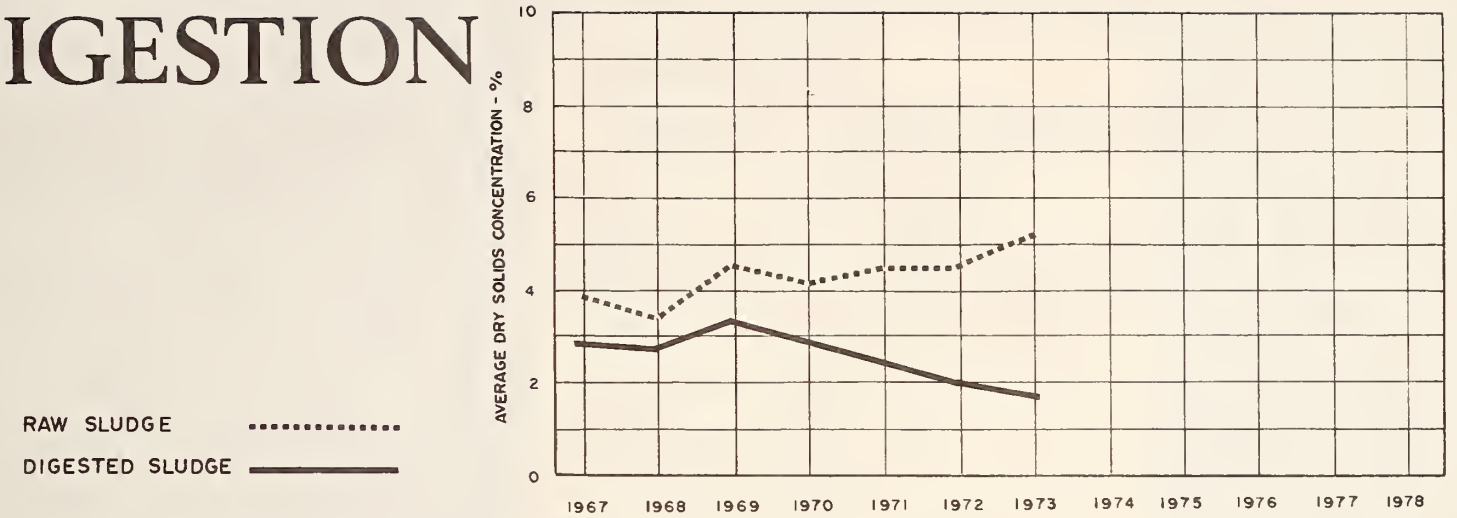


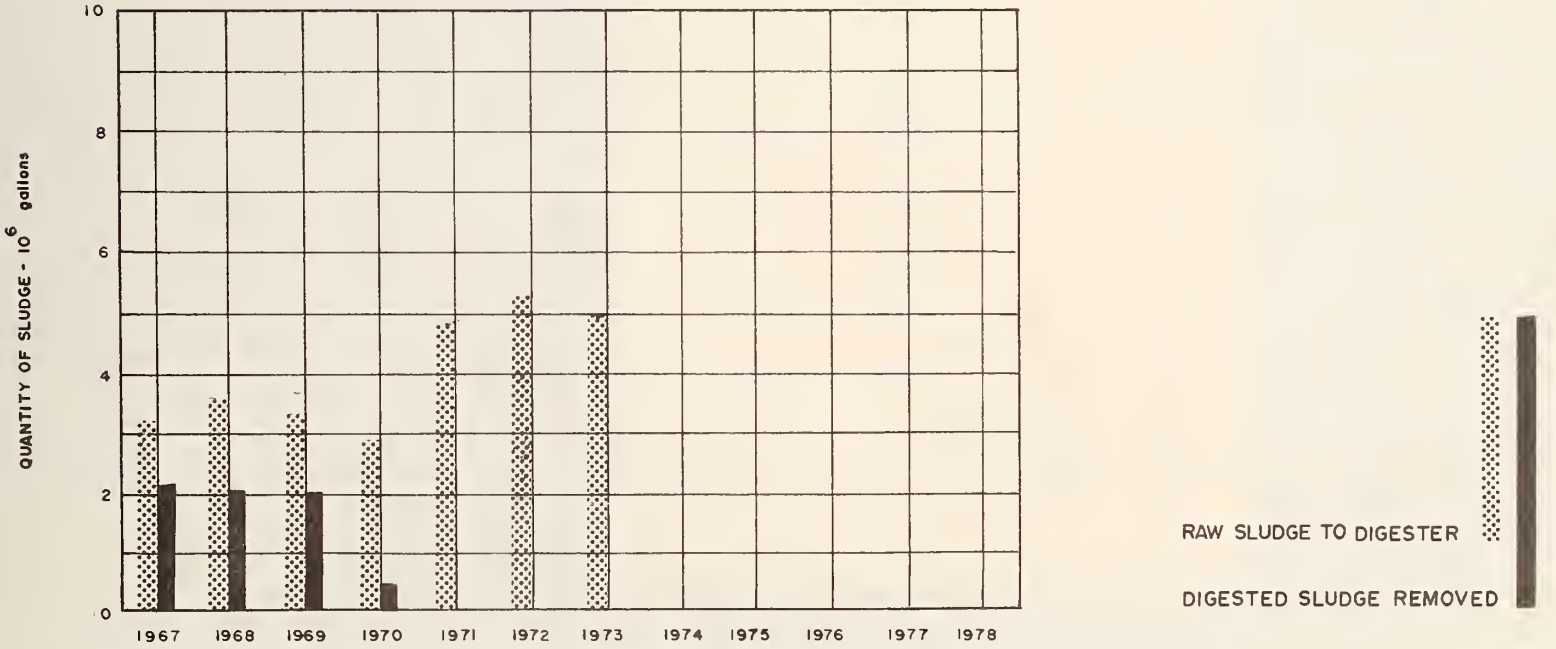


PLANT INFLUENT

PLANT EFFLUENT

DIGESTION


AVERAGE DRY SOLIDS CONCENTRATION - %
0
2
4
6
8
10
1967
1968
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
RAW SLUDGE
DIGESTED SLUDGE


QUANTITY OF SLUDGE - 10^6 gallons
0
2
4
6
8
10
1967
1968
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
RAW SLUDGE TO DIGESTER
DIGESTED SLUDGE REMOVED

TREATMENT DATA

MONTH	GRIT	CHLORINATION		PRIMARY EFFLUENT		AERATION			SLUDGE DIGESTION and DISPOSAL							
									RAW SLUDGE			DIGESTED SLUDGE			SUPER-	
	QUANTITY REMOVED cubic feet	Cl_2 USED 10^3 pounds	AVG DOSE mg/l	BOD mg/l	SUSPENDED SOLIDS mg/l	MLSS CONC mg/l	F/M day^{-1}	AIR $\frac{1000\ ft^3}{lb\ BOD}$	QUANTITY 10^5 gallons	TOTAL SOLIDS %	VOL. SOLIDS %	QUANTITY 10^5 gallons	TOTAL SOLIDS %	VOL. SOLIDS %	NATANT T. S. %	AMOUNT HAULED cubic yards
JAN	119	3.5	5.8	120	70	1000	0.47	2.2	4.7	4.7	73	2.8	1.7	61	1.7	1656
FEB	91	3.1	6.6	73	120	1000	0.26	4.8	4.4	4.0	77	2.7	2.0	63	1.8	1584
MAR	96	3.6	5.0	44	85	1700	0.12	5.6	4.0	4.0	68	1.9	1.8	64	1.8	1152
APR	95	3.4	5.5	81	77	1800	0.20	3.4	3.4	5.7	71	2.0	1.9	57	2.0	1206
MAY	96	3.3	5.3	75	110	1800	0.16	3.7	3.9	3.9	74	2.6	1.8	60	2.2	1530
JUNE	80	3.6	6.8	88	75	1300	0.25	3.9	4.0	3.4	71	2.4	1.8	40	1.2	1432
JULY	81	2.9	6.4	64	70	1400	0.14	5.8	3.9	6.0	77	2.7	1.7	62		1602
AUG	84	3.1	6.4	140	280	2300	0.18	2.3	4.2	3.1	74	2.7	1.7	64	1.7	1578
SEPT	99	3.1	6.6	90	80	2600	0.11	3.2	4.1	6.7	74	3.2	1.7	64	1.8	1903
OCT	104	3.3	6.5	120	90	1900	0.21	2.6	4.6	6.8	78	2.5	1.6	66	1.7	1512
NOV	94	3.4	6.3	110	70	1600	0.26	2.1	4.9	4.4	77	3.1	1.6	66	1.6	1818
DEC	86	3.7	6.5	63	73	1800	0.13	5.0	4.0	10.0	84	2.6	1.5	66	1.3	1566
TOTAL	1125	40.0	-	-	-	-	-	-	50.1	-	-	31.2	-	-	-	18539
AVG.	1.6 cu. ft/mil gal	3.3	5.8	88	99	1700	0.21	3.7	4.2	5.2	75	2.6	1.7	61	1.7	1545

LAB